# Bently Nevada Systems Don't Cost ... They Pay

Synopsis of Savings is a regular feature for our ORBIT readers. Ideally, our customers will realize a return on investment through the use of our equipment. Our case histories and the contents of this column are testimonials to such results. However, we also receive regular reports of machines that are not properly instrumented and managed, resulting in savings *lost*. We like to share these with our readers as well, providing a reminder that there are not just benefits from proper machinery management, there are very real consequences when it is not managed.

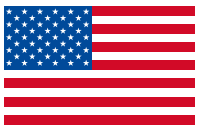
Just one week after commissioning a Trendmaster® 2000 system, personnel of a large refinery in Australia noticed an alarm on one of the newly monitored pumps. Subsequent investigation with a portable data collection instrument confirmed the validity of the Trendmaster® 2000 system's alarm, and the pump was removed from service. Upon disassembly, it was found that the pump bearing had collapsed. The heat buildup was enough to turn the shaft blue in the vicinity of the failed bearing. Plant personnel believe that, left unnoticed, the pump seal would have soon failed also. This would have resulted in leakage from the pump and a fire when the fluid contacted the hot shaft area or was ignited by sparks from the failing bearing.

The plant considers this a save, and a problem that would have gone unnoticed had they been relying on portable data collection intervals alone to manage these pumps. While difficult to assess the potential cost of a fire or its extent, it is reasonable to assume that this single event may have paid back the cost of the Trendmaster® 2000 system, suggesting a payback time of just *one week*.

One of the largest power generation companies in Brazil recently installed 3500 Series machinery protection systems and Data Manager® 2000 software on two hydrogenerators. Prior to the installation, the customer had never obtained the maximum available output power on both generators, particularly under low water level conditions. The low water level critically affects machine stability, and it was previously impossible to compare the vibration in the three bearings with the output power while changing the angle of the turbine blades and the wicket gate positions. The customer was afraid of setting full output power because of concern that mechanical damage to the turbines would occur.

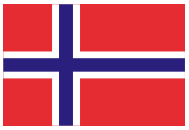
After the installation, it was possible to compare all the above variables on a single Data Manager® 2000 screen – mainly, blade opening angles and wicket gate positions along with the vibration levels – and obtain a 4 MW improvement in the machine's output without jeopardizing its mechanical integrity. Assuming the units run 22 days per month at 2 hours per day, the payback for their investment was a little over 10 months. If the units go to full-time operation, the payback is *less than one month*. The customer was so impressed with the quantifiable results of their investment that they now intend to install similar systems on four other units.

Bently Nevada machinery management services (mms) engineers were recently called upon to investigate a rotating machinery problem on an offshore compression platform off the coast of India. Our mms team responded within 12 hours and concluded that the 150-micron relative displacement reading on one of the customer's compressor units was due to a rub near the seal and outer labyrinth area. Based on the report, the customer planned an immediate shutdown and found the diagnosis to be correct. Replacing the defective component reduced the relative displacement to 30 microns and eliminated the need to flare the leaking gas, which was estimated to have been costing a loss of 44,500 USD per day.



An electric generating customer in the USA recently justified the cost of a multi-million dollar retrofit project for turbine supervisory instrumentation on their large steam turbine generators by noting an interesting fact: the cost of proper instrumentation was less than

10% of the replacement cost of the rotors alone, not to mention the other components in the machine. This did not even consider the cost of lost production – itself substantial. Because Bently Nevada provides instrumentation that directly observes the machine's shaft, subtle changes in condition can be noted early, averting damage altogether, or at least minimizing it.



A production ship extracting oil from a North Sea well (off the coast of Norway) and re-injecting the well's gas uses three reciprocating compressors. The compressors are critical to production and if any one of the three stops, the ship has to flare excess gas rather than re-inject it into the well. Flaring is costly and undesirable due to a $CO_2$ emissions tax of 19,000 USD per day.

One of the compressors is fitted with Bently Nevada proximity probes and a 3300 Series monitoring system. The other two are fitted only with simple mechanical "vibration switches." Machinery problems occurred at different times with all three compressors; however, only the machine fitted with Bently Nevada instrumentation was tripped before more extensive damage occurred. The other two machines sustained significant damage when the "vibration switches" failed to detect machine distress.

As a result, the customer is now establishing a more extensive monitoring system for all three compressors, consisting of cylinder impact measurements, frame vibration monitoring, and rod drop monitoring.

Based on the daily oil production rate of 85,000 barrels, and the increased $CO_2$ taxes associated with running only one compressor, the cost of these failures is about 19,000 USD per day, not including mechanical repair costs for the damaged compressors. The customer has justified the purchase of these monitoring systems based on their estimates of an availability increase of 5% as a result of better condition monitoring and machine protection. This represents an annual savings of approximately 300,000 USD and a payback time of their instrumentation investment of well under a year.